ABOVEGROUND HOME SHELTER

H-I 2-2
JUNE 1980
(Supersedes H-12-2
dated Feb. 1973
which may be used.)

Protection is provided in an outside aboveground shelter. The shelter can be used as a tool shed or workshop.

federal emergency management agency

GENERAL INFORMATION

This family shelter is intended for persons who prefer an aboveground shelter or, for some reason such as a high water table, cannot have a belowground shelter. In general, belowground shelter is superior and more economical than an aboveground shelter.

The shelter is designed to meet the standard of protection against fallout radiation that has been established by the Federal Emergency Management Agency for public fallout shelters. It can also be constructed to provide significant protection from the effects of hurricanes, tornadoes, and earthquakes, and limited protection from the blast and fire effects of a nuclear explosion. 1/ It has sufficient space to shelter six adults.

The shelter can be built of two rows of concrete blocks, one 12" and one 8", filled with sand or grout, or of poured reinforced concrete. Windows have been omitted; therefore, electric lights are recommended for day to day use.

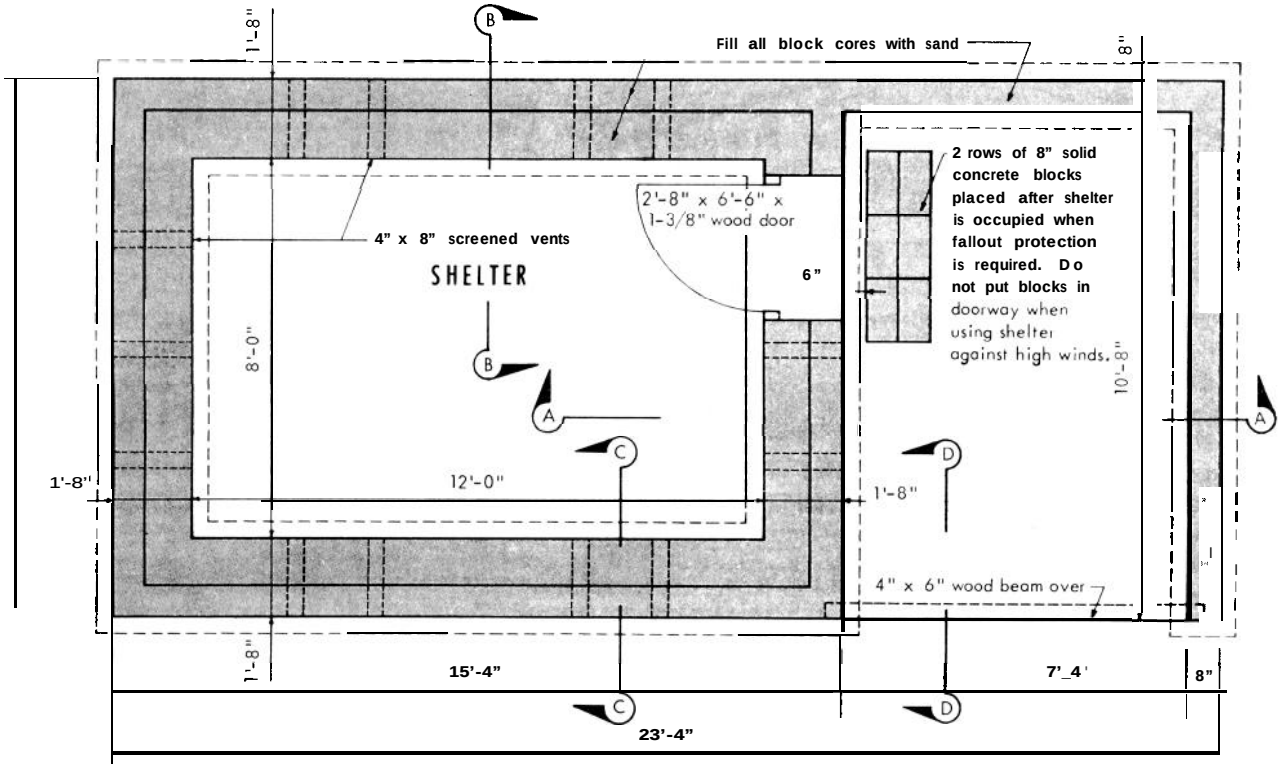
The details and construction methods are considered typical. If materials other than shown are selected -- for example, concrete block faced with brick -- care should be taken to provide at least the same weight of materials per square foot: 200 lb. per sq. ft. in the walls and 100 lb. per sq. ft. in the roof. The wood frame roof over the reinforced concrete ceiling probably would be blown off by extremely high winds such as caused by a blast wave or tornado. However, the wood frame roof is intended primarily for appearance; the concrete ceiling provides the protection. When using the shelter for protection against high winds, DO NOT place the concrete blocks in the doorway or windows.

This structure has been designed for areas where frost does not penetrate the ground more than 20 inches. If 20 inches is not a sufficient depth for footings, one or two additional courses of concrete blocks may be used to lower the footings. Average soil bearing pressure is 1,500 lb. per sq. ft. Most soils can be assumed to support this pressure without special testing or investigation.

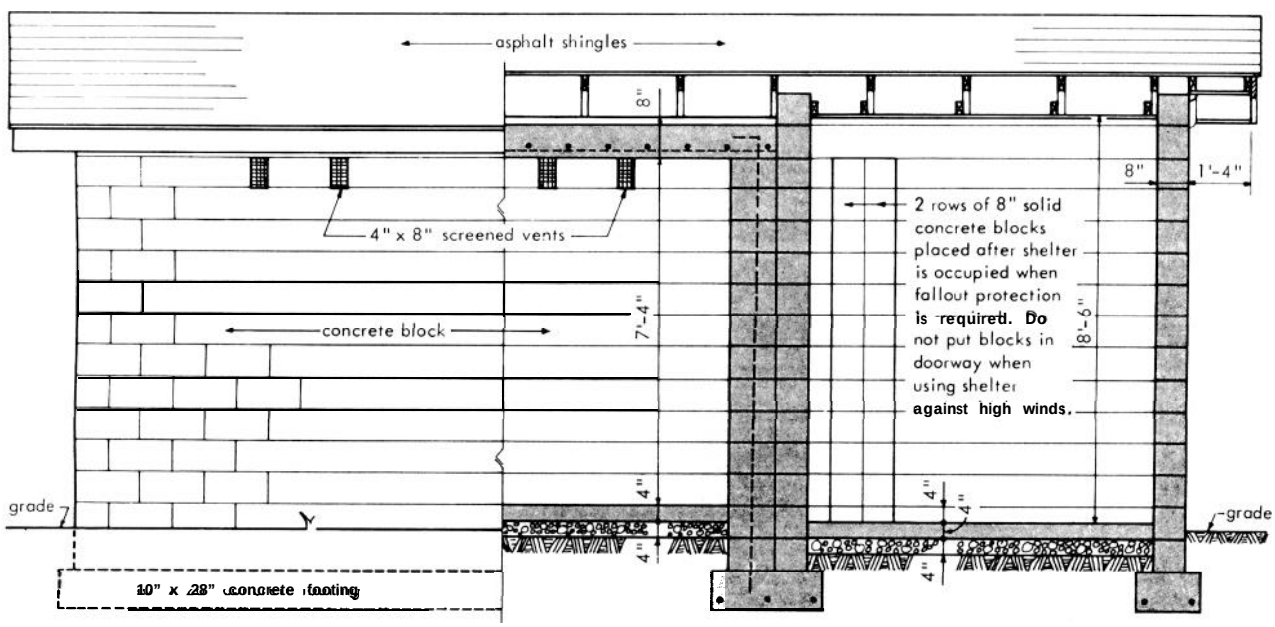
The baffle wall outside the entrance to the shelter is extended out 7'-4" to allow storage of lawn equipment such as wheelbarrows and lawn mowers. If additional space is desired, extend this dimension.

Before starting to build the shelter, make certain that the plan conforms to the local building code. Obtain a building permit if required. If the shelter is to be built by a contractor, engage a reliable firm that offers protection from any liability or other claims arising from its construction.

1/ This shelter will withstand over-pressures of up to 5 p.s.i.

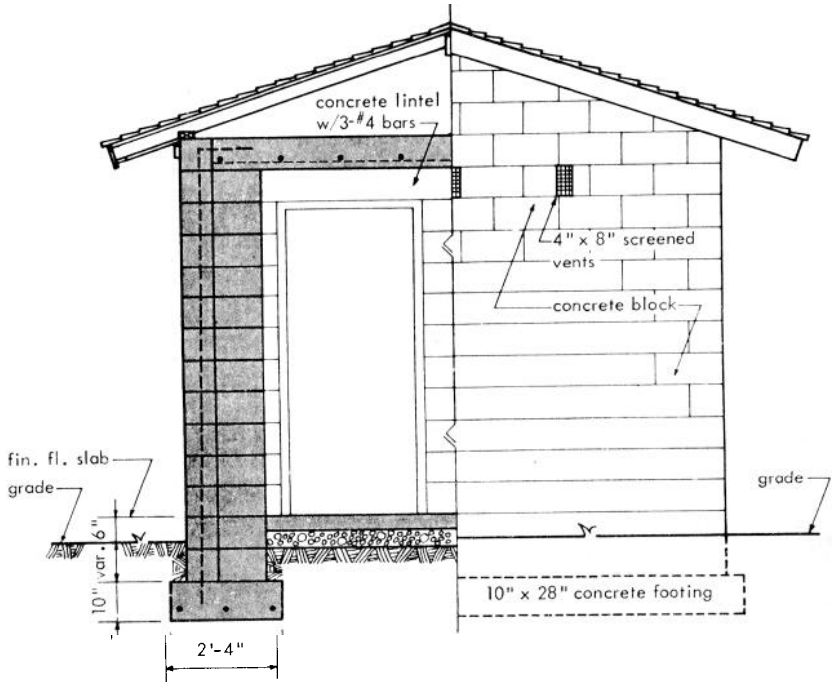

Fill all block cores with sand
2 rows of 8" solid concrete blocks placed after shelter is occupied when fallout protection is required. Do not put blocks in doorway when using shelter against high winds.
4" x 8" screened vents
SHELTER
2'-8" x 6'-6" x 1-3/8" wood door
6"
8'-0"
10'-8"
12'-0"
1'-8"
4" x 6" wood beam over
15'-4"
7'-4"
8"
23'-4"

PLAN


asphalt shingles
8"
4" x 8" screened vents
concrete block
7'-4"
2 rows of 8" solid concrete blocks placed after shelter is occupied when fallout protection is required. Do not put blocks in doorway when using shelter against high winds.
8'-6"
1'-4"
grade
4"
10" x 28" concrete footing

ELEVATION

SECTION A-A



SECTION B-B ELEVATION

NOTES

Provide horizontal joint reinforcement for 1'-8" walls in every third course and metal cross ties at 2'-0" o.c. in every alternate course.

If concrete is used in place of block, the walls of the shelter shall be 1'-2" thick with #4 bars at 14" o.c., each way, each side.

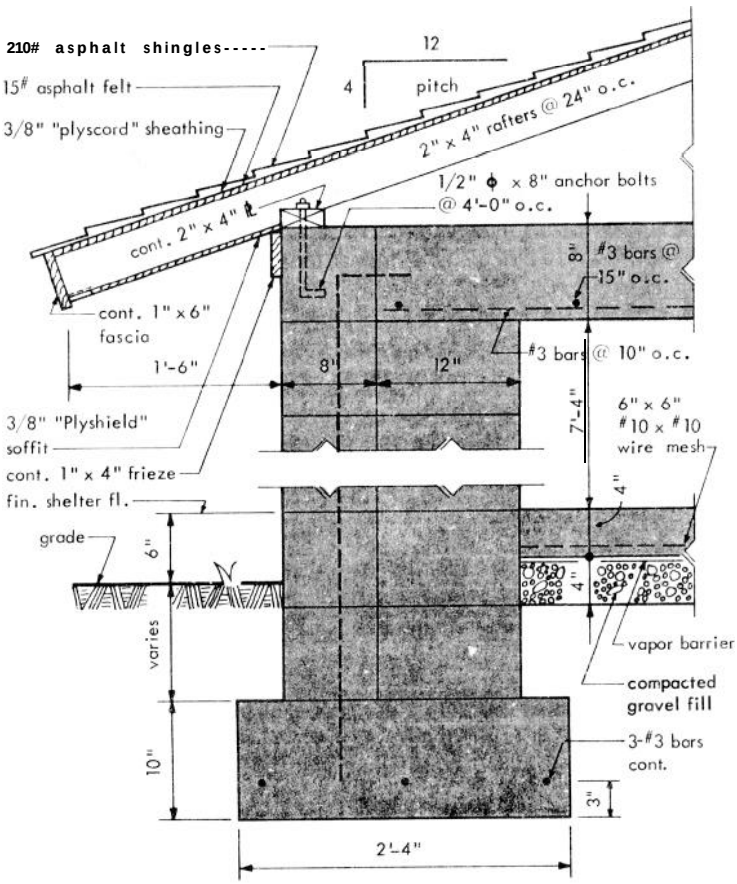
The dimension from finish grade to bottom of footings is dependent upon the depth of frost and varies with geographic location. Consult your local building code.

In areas subject to hurricanes, tornadoes, or earthquakes, walls shall be reinforced with #4 bars at 16" o.c. vertically. Place bars in block cells and then fill with grout. Lop bars between wall and footing dowels, and between wall and roof slab.

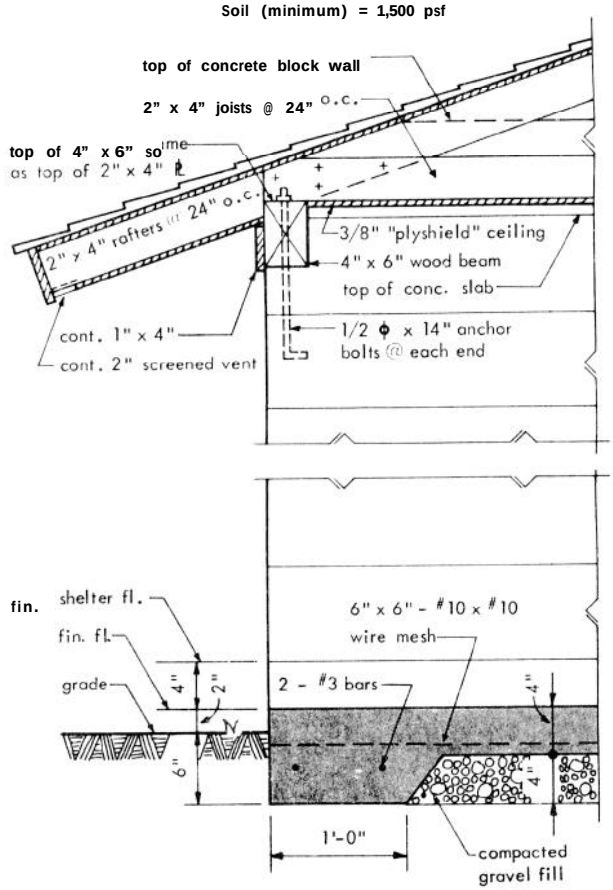
The wood frame roof over the reinforced concrete ceiling probably would be blown off by extremely high winds such as caused by a blast wove or tornado. However, this roof is primarily intended for appearance; The concrete ceiling provides the protection.

Structural design data:

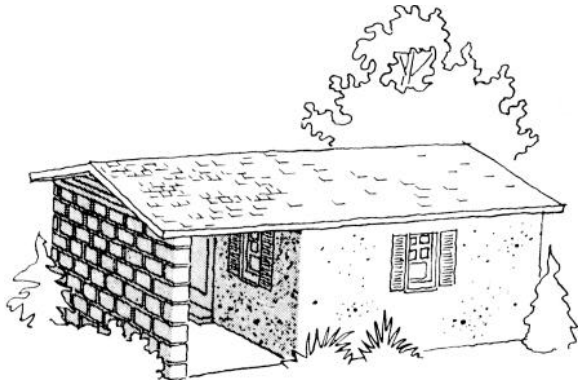
Steel = 20,000 psi
Concrete = 2,500 psi
Soil (minimum) = 1,500 psf



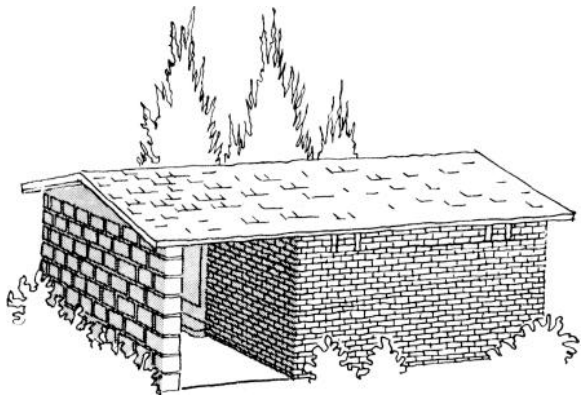
SECTION C-C



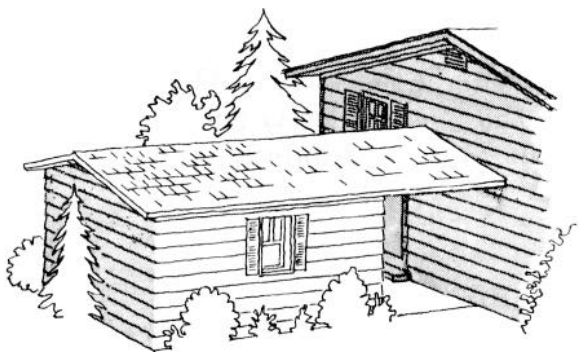
SECTION D-D



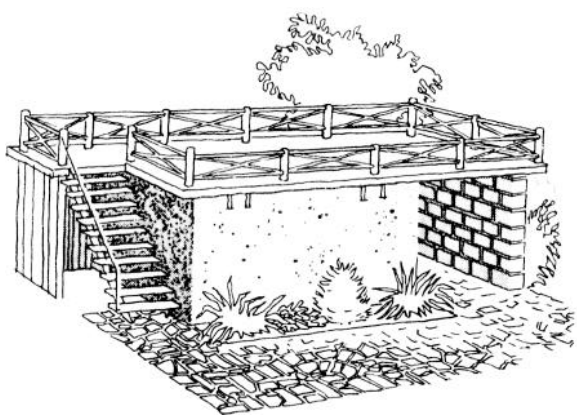
FIRST ALTERNATE indicates windows in the workshop area. Solid blocks, equal to a thickness of 12 inches, should be available to fill these openings to provide adequate fallout protection. Window sizes should be kept small. When using the shelter for protection against high winds, do not place the concrete blocks in the doorway or windows.



SECOND ALTERNATE shows the cement block faced with bricks. Use one course 4-inch brick and two courses of 8-inch cement block to obtain the required weight per unit area.



THIRD ALTERNATE is to attach the tool shed or workshop to the house, with a covered area between. In this case, the facing materials should match the house.



FOURTH ALTERNATE is to install built-up roofing of asphalt or tar, or other wearing surface, on top of the concrete deck.

GUIDE TO CONTRACTS AND SPECIFICATIONS

It is generally advisable to have a written contract with your contractor as well as specifications to supplement the drawing. A widely used and convenient contract form for construction of this size is AIA Document A 107, "Short Form For Small Construction Contract Stipulated Sum," which is available from the American Institute of Architects, 1785 Mass. Ave., Washington, D.C. 20036. It would be impractical to write a specification to suit every local condition; however, the following summary of generally accepted construction materials and practices is a useful guide:

CONCRETE

For details of concrete construction, follow "Building Code Requirements for Reinforced Concrete (AC I-3 18-71)." This publication can be obtained from the American Concrete Institute, Detroit, Michigan 48219.

DAMPPROOFING

Dampprcofing the bottom slab is necessary to make the room more comfortable in most areas. Any contractor will be accustomed to compacting gravel and applying a polyethylene vapor barrier course. In areas that regularly experience high humidity, the outside walls of the block or concrete should be treated with a colorless type of protective coating material which is readily available at building supply stores. In areas of very low humidity, dampproofing might be omitted.

VENTILATION

Ventilation is obtained by natural convection. Air will enter the doorway and be exhausted through the holes at the ceiling. If a roof exhaust ventilation system is desired, the following manufacturer makes units that will meet the requirements:

Penn Ventilator Co.*/
Red Lion and Gantry Rd.
Philadelphia, Pennsylvania 19115

*/The listing of a specific manufacturer of equipment does not denote a preference for his products.

OPTIONS

To accommodate additional persons, increase the shelter length 2' -6" for each two shelter spaces. Do not increase the 8' -0" width.

Lighting and receptacles may be installed with electric service obtained from a separate residence circuit. A branch circuit breaker should be installed inside the shelter.

MATERIALS LIST

Item		Quantity
Concrete:		
footings		4.5 cu. yd.
floor		2.3 cu. yd.
ceiling		3.4 cu. yd.
	Total:	10.2 cu. yd.
Steel Reinforcing:		
footings (3# deformed bars)		198 lin. ft.
ceiling (3# deformed bars)		257 lin. ft.
walls (4# deformed bars for hurricane, tornado, or earthquake resistance)		
	approx.	300 lin. ft.
	Total:	755 lin. ft.
tie wire		100 lin. ft.
Masonry:		
8" X 8" X 16" hollow concrete blocks		800
12" X 8" X 16" hollow concrete blocks		430
8" X 8" X 16" solid concrete blocks		75
sand (to fill cores)		12-1/2 yd.
Mortar:		
sand		1-1/2 yd.
portland cement		9 bags
lime		2 bags
Lumber: ("construction"grade)		
2" X 4" X 8'-0" roof rafters		32 pcs.
1" X 6" ridge		26 lin. ft.
2" X 4" X 12'-0" ceiling joists		5 pcs.
4" X 6" X 8'-0" beam		1 pc.
2" X 4" bearing plate		36 lin. ft.
4'-0" X 8'-0" X 3/8" "plyscord" sheathing		13 sheets
4'-0" X 8'-0" X 3/8" "plyshield" soffit & ceiling		6 sheets
1" x 4" x 3/4"		48 lin. ft.
1" X 6" X 3/4"		84 lin. ft.
3/4" - 1/4 ϕ		24 lin. ft.
2'-8" X 6'-6" X 1 3/8" solid core wood door		1
2'-8" X 6'-6" X 5 1/2" wood iamb		1

Miscellaneous:

15# roofing felt	4 1/2 squares
210# asphalt shingles	4 1/2 squares
1/2" ϕ X 8" anchor bolts	12
1/2" ϕ X 14" anchor bolts	2
copper screen	20 sq. ft.
6" X 6" - #10 X #10 wire mesh	200 sq. ft.
polyethylene vapor barrier (4 mil)	200 sq. ft.
gravel fill	2 1/2 yds.
4" butts w/screws	3
lockset	1
16d common nails	25 lb.
8d common nails	20 lb.
6d common nails	10 lb.
8d casing nails	5 lb.
exterior paint, primer	5 gal.
exterior paint, 2 coats	6 gal.
interior paint, primer	4 gal.
interior paint, 2 coats	5 gal.

Distribution:

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